The use of a community-based survey to determine the distribution of the Platypus *Ornithorhynchus anatinus* in the Huon River catchment, southern Tasmania

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ABSTRACT

A community-based survey was conducted to establish the current distribution of the platypus *Ornithorhynchus anatinus* in the Huon River catchment, southern Tasmania. The species was found to be common and sighted in waterbodies throughout the Huon River catchment. Fewer platypuses were sighted in the eastern part of the catchment, where rainfall is lower and mudstone is the dominant geology. The absence of platypus sightings from some rivers needs further investigation as it may reflect geology, stream ecology or land use practices. Smaller waterbodies such as farm dams and creeks appeared to provide important habitat. A number of platypuses were also observed in estuarine areas where salinity levels were high. The survey also indicated that the platypus is an effective icon species for raising community awareness of the issues surrounding catchment management and river protection.

Key words: Platypus, distribution, Tasmania, catchments, community education.

Introduction

The platypus Ornithorhynchus anatinus, a semi-aquatic monotreme, is found in freshwater systems across eastern Australian from Cooktown down to Tasmania (Grant 1995). While the platypus is considered common across much of its range, recent surveys and anecdotal observations suggest that many populations in both urban and agricultural catchments have declined or become fragmented (Goldney 1995; Grant 1998; Lintermans 1998; Lunney et al. 1998; Serena et al. 1998; Rohweder and Baverstock 1999). This decline is likely to be associated with human land-use practices that can alter the hydrologic and sediment regimes and the stability of banks (Rohweder 1992; Bryant 1993; Goldney 1995; Woon 1995; Williams and Serena 1998).

In Tasmania, statewide surveys suggest that the species is common, with platypuses observed in a diversity of waterways, including wild rivers, farm dams, urban creeks, estuarine areas and cave systems (Grant 1992; Hird 1993; Connolly and Obendorf 1998; Lichon 1999). Yet there have been few surveys examining the distribution of platypus populations throughout individual catchments in Tasmania, which may provide a different picture of platypus distribution (Rohweder and Baverstock 1999; Grant et al. 2000).

The Huon River catchment is located in southern Tasmania and platypuses are known to occupy the many waterways in the catchment (Connolly and Obendorf 1998; personal observations). In 1995, the Huon Valley Council, whose municipal area covers the entire Huon River catchment, implemented an environmental project ('Huon Healthy Rivers') to enable strategic catchment management, environmental monitoring and community education. A platypus survey was initiated to raise community awareness of the need for better management of freshwater ecosystems. The use of such icon species is considered essential in maintaining high community interest in long-term environmental projects such as the Huon Healthy Rivers Project (Hilbig 1999; Van Matre 1999).

Community-based surveys have been recognised as valid methods of establishing the historical and current distribution of many mammal species, including the platypus (Grant 1981; Goldney 1995; Lunney et al. 1998; Rohweder and Baverstock 1999). Indeed, much of the knowledge about platypus distribution in other parts of its range comes from community-based surveys (e.g. Dove 1979; Grant 1992; Lunney et al. 1998; Turnbull 1998; Rohweder and Baverstock 1999).

This paper summarises the results of the Huon Healthy Rivers Project platypus survey and discusses the distribution of sightings throughout the Huon River catchment and the type of habitats in which platypuses were observed.

Methods

Survey area

The Huon River, in southeast Tasmania, has a catchment area of approximately 3, 900 km^2 (Huon Catchment Healthy Rivers Project 1997) (Fig. 1). It starts at Scotts Peak Dam (part of the Gordon Power Scheme) and travels some 100 km to reach the D'Entrecastreaux Channel. An additional part of the Huon Valley region (between Dover and Cockle Creek), which is not part of the Huon River catchment, was included in the survey because the region is included in the activities of the Huon Healthy Rivers Project.

The far western section of the catchment is part of the World Heritage Area and includes Southwest National Park and Hartz Mountains National Park. The central section of the catchment is predominantly land dedicated as State Forest and managed by Forestry Tasmania, while the eastern section is private land, principally used for orchard, beef and other agricultural enterprises, and rural residences.

For the purposes of this survey, the Huon Valley was separated into five regions based on subcatchment boundaries and similarities in

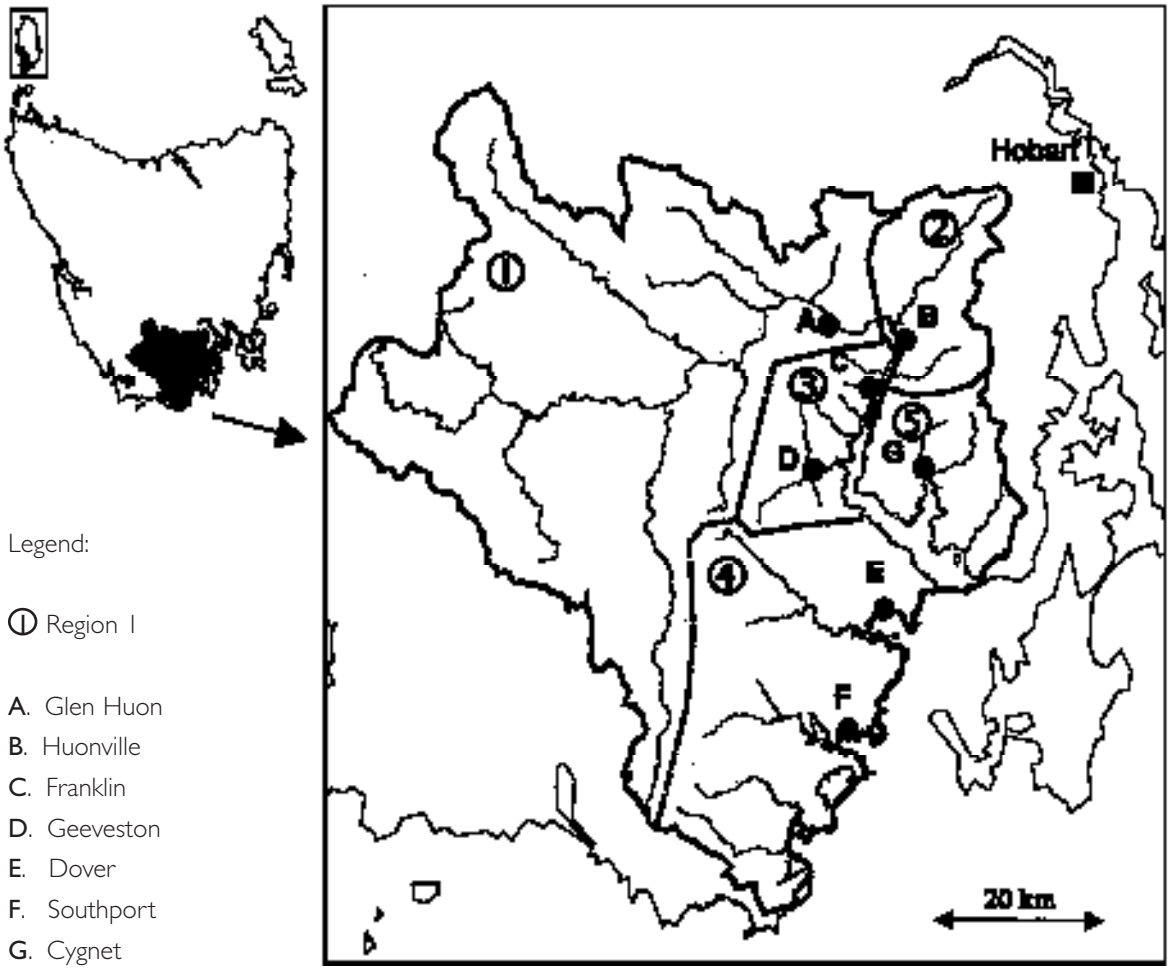

Figure 1 Catchment area of the Huon River with Regions 1 -5 and major population centres (A - G).

water quality, land use practices and population density (Fig. 1). Water quality information was based on conductivity, turbidity, pH, water temperature, ortho-phosphate and faecal bacteria data collected between 1996 and 2000 (Otley, 2001). Excellent quality water refers to waterways with low turbidity (<5 NTU), conductivity (<150 μS), ortho-phosphate (<0.08 mg/L) and faecal bacteria levels (<100 E. coli counts per 100 mL), and a pH range between 6.0 and 7.0 (Otley, 2001). Poor quality water has higher turbidity (>20 NTU), conductivity (>500 μS), ortho-phosphate (>0.03 mg/L) and faecal bacteria levels (>400 E. coli counts per 100 mL), and a pH range below 6.0 or above 7.5 (Otley, 2001). Waterways with the levels of the parameters between these values were considered of fair quality.

Region 1. Upper Huon - West Ranelagh: This region includes the upper catchment area of the Huon River, and the small towns of Judbury and Glen Huon. This region is the least altered of the five regions, with minimal development, low intensity land use practices, and excellent water quality (CSIRO 2000; Otley 2001).

Region 2. Mountain River - Woodstock: Region 2 incorporates the towns of Ranelagh, Mountain River, Huonville and Pelverata**.** This area has been heavily altered, with much of the region partially cleared for orchards, cattle grazing and rural residences, including for 720 people in Huonville/Ranelagh (Australian Bureau of Statistics 1998). Despite these land alterations, the water quality along Mountain River and Huon River is fair (Otley 2001)**.** The Huon River becomes estuarine just upstream of Huonville.

Region 3. North Franklin - Glendevie: This region includes approximately 1200 people spread across the townships of Franklin, Castle Forbes Bay and Geeveston (Australian Bureau of Statistics 1998). Although much of the flat land adjacent to the Huon River has been cleared, the remaining catchment area is still forested. Kermandie River has fair water quality, with high levels of faecal bacteria recorded infrequently (Otley 2001).

Region 4. Dover - Cockle Creek: Region 4 is considered to be the second least altered region, with many waterways having fair or excellent water quality (Otley 2001). Cleared land is found predominantly surrounding Dover, a small township of 480 people (Australian Bureau of Statistics 1998). Forestry activities occur along the upper catchments of the larger rivers including the Esperance and Lune Rivers.

Region 5. Cradoc - Verona Sands: This region, particularly surrounding Cygnet, is considered to be the most environmentally degraded area in the Huon Valley (Huon Catchment Healthy Rivers Project 1996). A number of waterways have poor quality water due to elevated turbidity and faecal bacteria levels (Otley 2001). Much of the area has been cleared for a variety of agricultural practices and rural residences. Cygnet is the second largest township in the Huon Valley with 850 people (Australian Bureau of Statistics 1998).

Survey methods

The distribution of the platypus in the Huon River catchment and other waterways south of Dover (Region 4) was established from the community-based survey and sightings from the Department of Primary Industries, Water and Environment and Connolly and Obendorf (1998).

The community-based survey ran during April 2000 as 'Platypus 2000'. Through advertisements in southern Tasmania print and radio media, and school newsletters, the general public was encouraged to report platypuses seen between 1 January to 30 April 2000 and any other sightings between 1970 and 1999.

During April, survey forms, colour posters and return boxes were located at all post offices / shops and schools in the Huon Valley. Two community festivals were also attended with any sighting information recorded in person. People with known sightings and frequent users of waterways – Landcare and Waterwatch Groups, Department of Primary Industries, Water and Environment, Huon Valley Council and forestry company officers and fishing and rafting associations – were also sent survey forms.

The survey form was adapted from Connolly and Obendorf (1998). The form included the following fields: observer name and contact details, waterway name and type (e.g. creek, river, dam), location of sighting and/or map grid co-ordinates, date and time, sighting frequency (i.e. single or frequent) and surrounding habitat. The importance of a precise sighting location was highlighted on the form, since other community-based platypus surveys have produced a high proportion of sightings for which map co-ordinates could not be determined (J. Chapman personal communication).

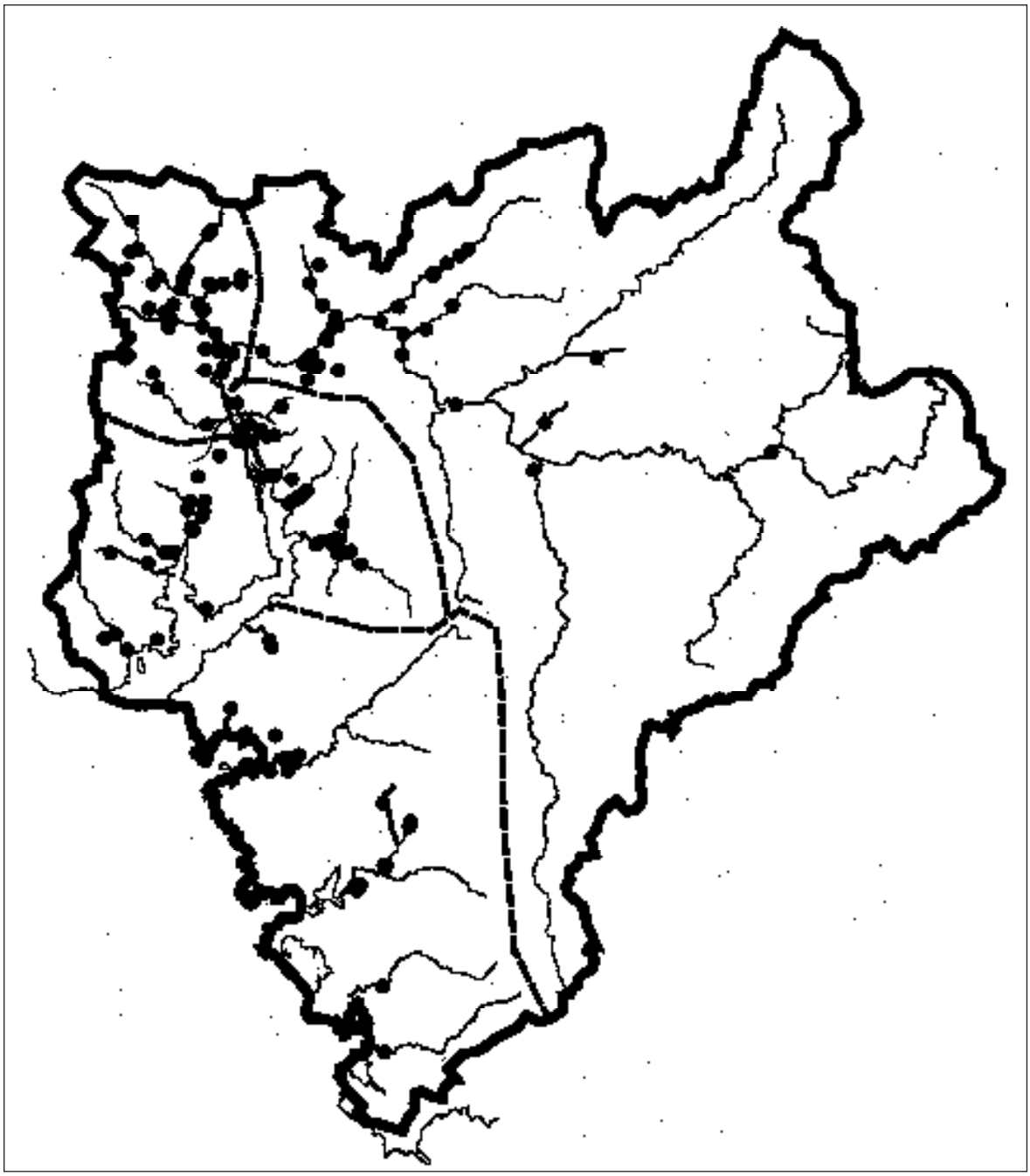

Figure 2 Location of platypus sighted between 1970 - 2000.

For each sighting, the stream order was determined using the Strahler numbering system (Strahler 1964) and the surrounding vegetation community was assigned using a Regional Forest Agreement vegetation map (Tasmanian RFA 1997).

After an initial analysis of the distribution map, areas where platypuses were likely to occur were identified. If no surveys were returned in those areas, known local residents (approximately 20) were contacted by phone and any sighting information was recorded in person on the survey form.

In this paper, any subcatchment creeks that are second order or greater have been counted as separate waterways.

Results

Survey response

One hundred and seventy-six platypus sightings from 148 separate locations were collected, including 21 sightings held in existing databases. One hundred and two of the sightings were of platypuses seen between 1970 and 1999, and 74 of the sightings were for platypuses seen in the first four months of 2000.

One hundred and ten people reported platypus sightings, with 78 people having had no previous contact with the Huon Healthy Rivers Project. Forty-six surveys were returned directly to the Huon Healthy Rivers Project and 24 surveys were left in the return boxes in post offices and schools. Sixty-one sightings were collected from two festivals and three sightings were received from fishing and rafting associations. A further 20 positive sightings along six waterways were obtained from eight residents contacted directly in the areas where no surveys were returned.

Distribution of sightings

The platypus was sighted in 55 waterways in the Huon River catchment between 1970 and 2000 (Fig. 2). In Region 1 (Upper Huon - West Ranelagh), the platypus was seen in 14 of the 16 waterways (creeks of second order and larger) in the region, including many large and swiftly flowing rivers, such as the Huon River, Picton River and Weld River (Table 1). Platypuses were seen in nine of the ten waterways in Region 2 (Mountain River - Woodstock), including Huon River, Kellaways Creek and Mountain River, but not in Fletcher Creek.

Platypuses were sighted in 11 of the 13 available waterways in Region 3 (North Franklin - Glendevie), with no platypuses seen in either Rileys Creek or Wilcox Creek. Many platypus sightings were close to Geeveston, a probable reflection of human population density, with a few platypuses also sighted in more remote areas such as Clarks Rivulet and Surges Creek.

Further south in Region 4 (Dover - Cockle Creek), platypuses were sighted in 12 of the 13 available waterways (Table 1). Platypuses were sighted in rivers that have high human usage such as Catamaran River and Lune River, and in waterways beside agricultural areas such as Dover and Glenbervie. Platypuses were not sighted in Settlement Creek at Southport.

In the eastern part of the Huon River catchment (Region 5), only 9 of 14 rivers had positive platypus sightings. The platypus was a common sight in the three largest waterways in the region, with, for example, platypuses sighted at nine locations in Agnes Rivulet, Cygnet. There were no sightings of platypus in a number of other smaller waterways with potential habitat such as Golden Valley Creek and Rocky Bay Creek (Fig. 2).

Number of sightings

The number of platypuses sighted in each region also reflected the uneven distribution of platypus sightings across the five regions in Huon River catchment. Region 2 and Region 3 had the highest number of overall platypus sightings, with 49 sightings between Mountain River and Woodstock, and 40 sightings between North Franklin and Glendevie during 1970 and 2000 (Table 1). Thirty-four platypuses were sighted in the upper catchment of the Huon River (Region 1). Significantly fewer platypuses were sighted between Dover and Cockle Creek (25 sightings) and between Cradoc to Verona Sands (27 sightings) (Fig. 2).

Table 1. Number of waterways in which platypuses have been sighted and the frequency of sightings in each of the five regions between 1970 and 2000.

	Total no. of waterways in the region	Number of waterways with platypus sightings			Number of platypus sightings		
		1970-1999	January-April 2000	1970-2000	1970-1999	January-April 2000	1970-2000
Region 1 - Upper Huon to West Ranelagh	16	10	9	14	21	13	34
Region 2 - Mountain River to Woodstock	10	8	8	9	27	22	49
Region 3 - North Franklin to Glendevie	13	10	8	11	26	14	40
Region 4 - Dover to Cockle Creek	13	8	8	12	15	10	25
Region 5 - Cradoc to Verona Sands	14	6	6	9	12	14	27
Total	66	42	39	55	102	74	176

Location of sightings

Of the 148 separate locations where platypus was seen, 21 of these locations had multiple sighting forms returned by either a single observer or separate observers. There were a number of sightings in the very upper catchments of many waterways, with one sighting 20 km downstream of Scotts Peak Dam (Fig. 2). However, platypus sightings were made most frequently in the smaller waterways, with 128 sightings in streams of order 1 and 2 (Fig. 3). Only 40 sightings were in larger and faster flowing rivers (stream orders 3 and 4). Farm dams were also a significant habitat for the platypus, with 38 sightings in creek-connected dams and 5 sightings in dams unconnected to any waterways.

There were a number of sightings in close vicinity to rural residences and township areas, with platypuses apparently seen on a daily basis in Geeveston at the Kermandie River Road bridge. Four platypuses were seen on land; one being a juvenile female in April 2000. These individuals were between 50 and 250 m from the nearest waterway.

Other unusual habitats included sightings of platypuses at six separate locations in the Huon Estuary. These locations included the Huon Highway bridge at Huonville where it is predominantly fresh water. Further downstream, platypuses were sighted near Franklin where surface salinity is between 5 and 10 ppt and also a further 5 km downstream where surface salinity approaches 20 – 30 ppt (CSIRO 2000). The true marine environment has a surface salinity of 35 ppt.

Ninety-four of the 176 (53 %) platypus sightings were made in waterways surrounded by cleared land. Of the 83 platypuses sighted in forested areas, 43 sightings were made in wet Eucalyptus obliqua forest, 33 sightings were made in dry E. obliqua, E. amygdalina and E. tenuiramis forests and 7 sightings were in A. dealbata (silver wattle) forest.

Forty-seven returned surveys had the actual sighting time recorded. More platypuses were seen during the afternoon than during the morning, with 14 platypuses seen between 3 and 6 pm (Fig. 4).

Discussion

Distribution of the platypus in the Huon River catchment

The platypus was distributed throughout the Huon River catchment, with positive sightings in 55 of the 66 (83 %) waterways between 1970 and 2000. Only eleven waterways were without

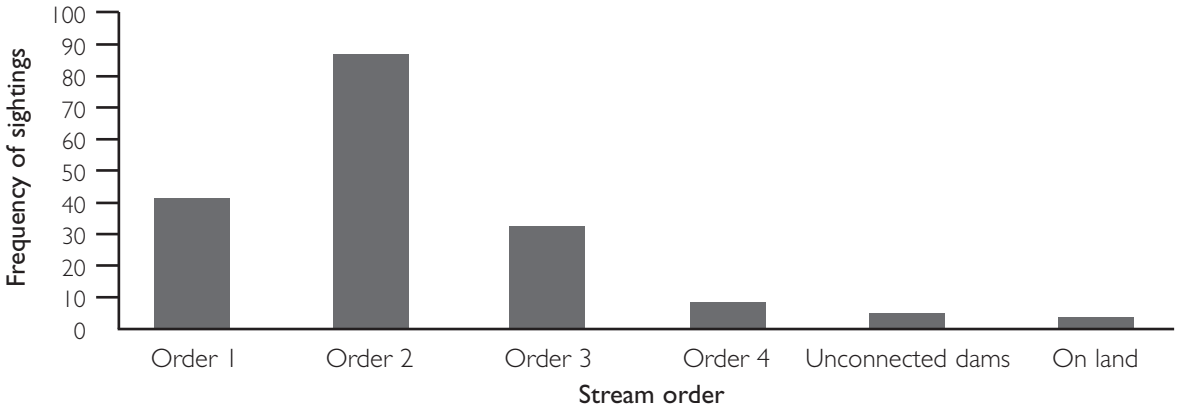

Figure 3. Frequency of sightings in streams, rivers, dams and on land.

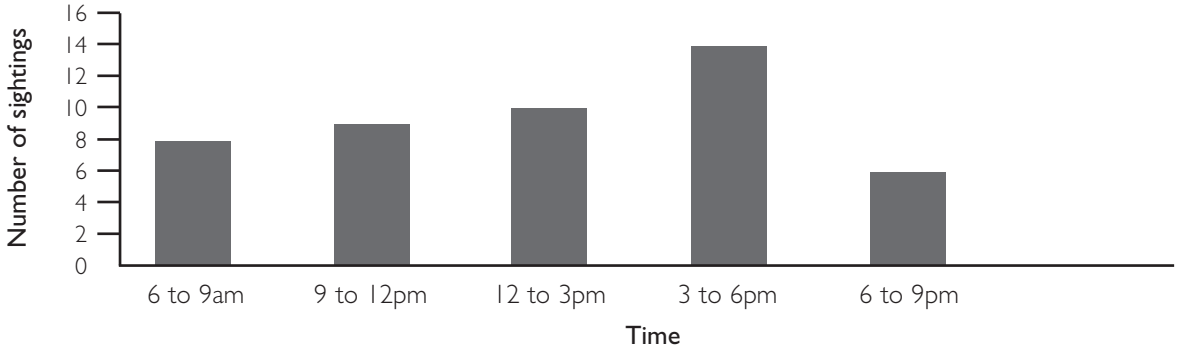

Figure 4. Time of sighting for 47 platypus sightings.

platypus sightings; two of these creeks were located in areas of infrequent human visitation. Further intensive surveys of these rivers are needed in order to confirm the absence or low population density of the species.

Across the Huon River catchment, there was an uneven distribution in the number of platypuses sighted. More platypuses were sighted in the upper Huon region, the Mountain River – Woodstock region and the North Franklin – Glendieve region. Fewer platypuses were sighted in the Dover – Cockle Creek and Cradoc - Verona Sands regions. In the Dover - Cockle Creek region, the lower number of sightings may be a reflection of low human population density, recreation use and area access. The Cygnet – Verona Sands region, in the eastern half of the Huon River catchment, on the other hand, is one of the more densely populated regions and has a well developed network of residential and recreational roads and tracks.

One important difference between the western and eastern parts of the catchment, which may help to explain the difference in platypus abundance, is rainfall, since the eastern part of the Huon River catchment receives far less rain than the western half (Tasmanian Bureau of Meteorology personal communication). This is reflected in the higher number of smaller and less permanent waterways in the eastern catchment (personal observation). Although platypuses are found in seasonal waterways (Turnbull 1998), smaller and more ephemeral waterways are not thought to be optimal habitat as they provide less food than larger permanent waterways (Faragher et al. 1979). This effect is also shown in the distribution of the species across Tasmania, with fewer platypuses sighted along the drier eastern coast of Tasmania compared to the wetter central and western parts (Connolly and Obendorf 1998).

Geology may also represent another important environmental factor in understanding the uneven distribution of the species across the Huon River catchment. While the western and northern part of the catchment is predominantly igneous rock (e.g. dolerite), the eastern catchment is dominated by fine-grained sedimentary rocks such as mudstone (Davies 1988). In consequence, disturbances to soil and riverbanks in the eastern part of the catchment may result in higher rates of erosion compared to the western part of the catchment. Certainly, waterways in the eastern part of the catchment are more turbid than those in the western part of the catchment (Otley 2001). Higher turbidity levels usually lead to a more finely grained benthic substrate, which reduces both prey abundance and the size of foraging areas (Williams 1983). In the Richmond River catchment in northern New South Wales, the distribution of the species reflects differences in the geological substrate, with fewer platypuses sighted in sandstone than basalt areas (Rohweder and Baverstock 1999).

In the Huon River catchment, platypuses were seen more often in the smaller first and second order creeks, rivulets (Order 1 and 2) and dams than in large third and fourth order rivers. This information adds weight to the growing recognition that smaller waterbodies are perhaps more important platypus habitat than larger waterbodies, particularly in altered catchments (MacLeod 1993; Serena 1994; Lunney et al. 1998; Turnbull 1998). Smaller waterbodies may be used more frequently by the species because the lack of depth leads to higher macro-invertebrate density (Williams 1983).

There were regular sightings of platypuses in the tidal waters of the Huon Estuary between Huonville and south of Franklin. While there have been a few sightings of platypuses in estuarine waters across its distribution, most of the sightings are from Tasmania, although without accurate salinity levels (T. Grant personal communication; Hird 1993; Connolly and Obendorf 1998; Rakick et al. in press). These sightings suggest that the platypus sometimes occurs in salinity levels close to seawater. While it is not known whether the platypuses observed in the Huon Estuary were foraging or simply travelling between freshwater areas, there is a sighting of a platypus foraging along a seashore near Burnie in northwest Tasmania (Rakick et al. in press).

The vast majority of platypus sightings were made during daylight hours, which is to be expected from community observations. In the Huon River catchment, platypuses were seen more frequently during the middle of the afternoon than during the morning. In comparison, in waterways on the central and southern tablelands of NSW, platypuses were seen more regularly in the hours immediately following daylight rather than in the same time period before darkness (Bryant 1993; Benson 1997; Rohweder and Baverstock 1999). The number of sightings made during daylight hours

in this survey supports recent radio-tracking and activity datalogger studies which show that while, at least across the eastern and southern parts of its range, the platypus is primarily a nocturnal species, some individuals within each population are diurnal (Grant et al. 1992; Grigg et al. 1992; MacLeod 1993; Serena 1994; Gust and Handasyde 1995; Otley et al. 2000; P. Bethge unpublished data).

No platypus road kills were sighted during the survey period and since the early 1980's none have been collected in the Huon Valley by the companies responsible for the removal of road killed animals (G. Thorpe and L. Paul personal communication). This is in contrast to the number of sightings of road killed platypuses near culverts and pipes in other parts of Tasmania (Tyson 1980; Taylor and Mooney 1991; Otley and le Mar 1998; Mooney and Spencer 2000). While in some cases poor culvert design prevents the platypus from using the pipes, for passable culverts, it is thought that the pipe size and/or speed and volume of water influences it's use by the species (Mooney and Spencer 2000; Otley and le Mar 1998). The lack of road kills in the Huon Valley may be due to the number of old wooden bridges and it is of concern that the Huon Valley Council generally replaces old bridges with multiple small pipes rather than larger culverts or bridges.

No sightings were made of alive or dead platypuses in the Huon River catchment with fungal (Mucor amphibiorum) ulcers. The fungus was first noted near Campbell Town in 1982, with recent trapping surveys and sightings from the community indicating that the fungus has since spread to between Wynard and Launceston in the north, and as far south as Dee Lagoon in the Central Highlands (Stewart and Munday 2000). Community surveys such as this one are essential in monitoring the spread of the disease throughout catchments in Tasmania.

Evaluation of methodology

Completed sighting forms were collected by all four methods employed: existing databases, media campaign, community festival attendance and resident interviews. While the 'Platypus 2000' media campaign collected 74 sightings, almost as many (64 sightings) were collected in person with residents at two community festivals. This personal contact also obtained records with more precise location information.

In general, the distribution of the species in the Huon River catchment followed human population size as has occurred in other platypus community-based surveys (Lunney et al. 1997; Rohweder and Baverstock 1999). However, in some regions (such as the Cygnet to Verona Sands region) there were fewer platypuses sighted than would be expected given the human population of the region. In addition, direct contact with the fishing and rafting associations and known residents increased the potential for sightings in the less inhabited regions and in areas where no surveys were returned. However, because non-sighting information was not collected, conclusions based on the distribution were made with some caution. Future community-based platypus surveys should consider collecting both positive- and non-sightings.

Community education

The community response to 'Platypus 2000' was positive, with one hundred and ten people reporting on their platypus sightings. The platypus appeared to be an effective way of attracting people to issues associated with freshwater management, particularly in the cause and effect relationship between land use practices and stream health. The platypus should be included in environmental educational material and activities, particularly those associated with stream bank protection. Participation is a key to any effective community awareness program (Alexandra et al. 1996; Coad et al. 1998), and monitoring of platypuses has been shown to be an effective way of getting the community involved in river care issues.

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